REMARKS

Reconsideration of this application is respectfully requested in view of the following remark.

Response to Rejections Under 35 U.S.C. § 103

Claims 1, 8-11, and 18-20 have been rejected under 35 U.S.C. § 103(a) as being unpatentable by Sukkar (USPN 6292778) in view of Haverinen et al. (USPN 7197456). Claims 3-7 and 13-17 have been rejected under 35 U.S.C. § 103(a) as being unpatentable by Sukkar (US 6292778) in view of Haverinen et al. (USPN 7197456), and further in view of Carey et al. (US 5526465).

The rejection of claims 1 and 11 in view of Sukkar and Haverinen is respectfully traversed on the grounds that the Sukkar and Haverinen patents fail to disclose or suggest an utterance verification method, as claimed, in which:

- the normalization parameters used to normalize the feature vectors are "*means and standard deviations of the feature vectors corresponding to the verification unit in training data*" that are **calculated in advance**.

Instead, the Haverinen patent, which is alleged to teach the claimed verification feature vector generation and normalization parameters, actually teaches calculation of normalization parameters dynamically during runtime, and **not in advance**. Furthermore, the Sukkar patent teaches an entirely different type of verification score based on a likelihood score ratio (discussed below) that does not involve any sort of normalized feature vector input to a verification unit corresponding classifier, as claimed, much less the claimed **advance calculation**.

The normalization disclosed by Haverinen focuses on improving noise robustness in speech recognition at the

front-end (Abstract), and is achieved by performing a histogram normalization step in the spectral domain (col. 5, lines 25-33). For improving noise robustness in speech recognition, both the training sets and the testing sets are used in the Gaussian algorithm. As for the testing spectral signals, the mean and the standard deviation are initialized to those with regard to the training set, and in addition to an alpha parameter, a 38-frames look-ahead buffer is used to estimate the parameters of current speech data for continuously updating the mean and the standard deviation to thereby perform the normalization on the testing spectral signals (col. 6, lines 5-46; col. 8, line 19; TABLE I and TABLE II). As a result, those skilled in the art will understand that the normalization parameters disclosed by Haverinen are dynamically calculated based on the parameters of training and testing sets in runtime, which in fact is similar to the Laurila et al. patent (col. 2, lines 16-21; FIG. 5 and associated description) applied in the previous Official Action.

As a result, Haverinen could not have made up for the deficiencies of Sukkar with respect to the recitation of feature vector normalization. To the contrary, the verification scores disclosed by Sukkar are determined as a ratio of the likelihood that the speech segment contains the sound associated with the subword hypothesis to the likelihood that the speech segment consists of a different sound (col. 10, line 66 to col. 11, line 3). Namely, the verification score is a likelihood score ratio of the sound associated with the subword hypothesis and the speech segment consisting of a different sound. This is fundamentally different from and not analogous to the verification score of the invention, which is obtained by inputting normalized feature vectors to a verification-unit corresponding classifier. As a result, independent claims

1 and 11 are believed to be patentable over the Haverinen and Sukkar patents, whether considered individually or in any reasonable combination.

With regard to claims 9-10 and 19-20, the training data used for training the MLPs in the invention are pre-corrupted by noise with different power levels of SNR (for example, the speech segments corrupted by in-car noise with SNRs of 9dB, 3dB, 0dB, -3dB, and -9dB are used to train the MLPs; see page 11, lines 9-17). In contrast, only a certain amount of noise is given in training by Sukkar, which is different from the present invention and has a poor performance than the MLP training provided by the invention. This is similar to the arrangement of Laurila, discussed in the previous response, which discloses a method for compensating the effects of noise and increasing the effect of speech recognition, which compares the method with the other methods at 5, 0, -5, -10 dB SNR (col. 6, lines 6-37) and different from the invention that directly experiences the telephone speech at the different SNRs but not compares with the other methods. In order to realize the advantage of the present invention, one can use a known method (Sukkar, R.A., "Subword-based Minimum Verification Error (SB-MVE) Training for Task Independent Utterance Verification" Proc. ICASSP'98, 1998) and the present invention to receive noise-corrupted speech signal for implementing verification to see the difference therebetween. The result can be seen in the supplementary document "MLP-BASD UTTERANCE VERIFICATION FOR IN-CAR SPEECH RECOGNITION." Briefly, the invention can provide good speech recognition when the environment is changed, especially in a heavy noise environment.

Accordingly, withdrawal of the rejection of claims 1, 8-11 and 18-20 is respectfully request.

Turning to the rejection of claims 3-7 and 13-17 in view of Sukkar, Haverinen, and Carey, the claimed invention

uses an MLP neural network as the classifier for changing the normalized feature vectors into the verification score, whereas Carey uses an MLP neural network for increasing discrimination between a personal model and a world model (col. 11, lines 15-20), and therefore Carey does not, as alleged by the Examiner, teach the features of claims 3 and 13. In addition, Carey uses a Baum-Welch backward pass algorithm and the likelihood information in MLP training in order to increase discrimination between the personal model and the world model, whereas the invention uses an error back-propagation algorithm and the information of sequences of verification feature vectors in MLP training in order to generate the verification scores. Moreover, Carey requires two values Pp and Pw for speaker utterance training (col. 11, line 60 to col. 12, line 7), but the invention only uses the target value for speech segment training.

Accordingly, dependent claims 3-7 and 13-17 are believed to be patentable over the Carey, Haverinen and Sukkar patents, whether considered individually or in any reasonable combination, and withdrawal of the rejection of claims 3-7 and 13-17 under 35 USC 103(a) is respectfully requested.

CONCLUSION

In view of the foregoing remarks, reconsideration and allowance of the application are now believed to be in order, and such action is hereby solicited. If any points remain in issue that the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned attorney at the telephone number listed below.

Respectfully submitted,

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